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High-resolution X-ray spectroscopy of the interstellar dust

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High-resolution X-ray spectroscopy offers a unique and powerful way to establish the properties of dust grains in the interstellar medium of our Galaxy. Defining the dust chemistry is an excellent tracer of structure formation and evolution in the Galaxy. Diagnostic features in the spectra of X-ray sources, like oxygen, magnesium, silicon and iron K-edges, can be used to determine the chemical composition, size, and crystalline structure of the cosmic dust. Here, I present the first and unique broadband extinction modelling of interstellar dust in the X-ray band based on our dedicated laboratory measurements of interstellar dust analogues. Indeed, to properly derive the dust properties from X-ray observations, it is essential to build a database of accurate cross-section models. We present also the latest results on the on-going chemical-composition mapping of the Galactic plane, based on the synergy between high-resolution X-ray Chandra spectra of bright binaries and our new extinction model (e.g. Zeegers 2017, Rogantini et al. 2019, subm.) Finally, I address the impact and full potential of our broadband extinction modelling with the advent of future X-ray missions (XRISM and Athena; Rogantini et al. 2018).

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

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